

## 4.11

### Writing & Solving Equations & Inequalities in One Variable

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

1. An open box is made from a rectangular piece of cardboard measuring 12 inches by 16 inches, by cutting identical squares from the corners and turning up the sides. What are the lengths of the sides of the removed squares if the area of the bottom of the open box is  $60 \text{ in}^2$ ?
2. The width of a box is 2 inches less than twice the height. The length is 4 inches less than three times the height. The volume is  $2240 \text{ in}^3$ . What are the dimensions of the box?
3. A triangular table top has a base that is twice as long as its height. If the area of the table surface is  $324 \text{ in}^2$ , what is the value of the height and the base?
4. A family had three children and were expecting a fourth. The oldest was 3 years older than the youngest. The youngest was one year younger than the middle child. How old was each child on the day their new sibling was born if the product of their ages was 987 more than three times the sum of their ages?

5. The junior class president and the vice president have decided to call all of the juniors to remind them of junior pride week. The president, working alone, can call all of the juniors in 6 days. The vice president, working alone, can call all of the juniors in 4 days. How long would it take them to call all of the juniors if they worked together?

6. Eva and Emily can clean the entire house in 4 hours. Eva can do it by herself in 6 hours. How long will it take Emily to clean the house by herself?

7. The velocity of water flow, in feet per second, from a fire hose nozzle is given by  $v(p) = 12.1\sqrt{p}$ , where  $p$  is the nozzle pressure in pounds per square inch (psi). Find the nozzle pressure if the water flow velocity is 110 feet per second. (Source: Houston Fire Department Continuing Education) **Round answer to nearest thousandths.**

8. The frequency, in hertz, of a violin string can be modeled by the equation  $f(t) = 49.1\sqrt{t}$ , where  $t$  is the tension in newtons. What is the amount of tension applied if the frequency of the violin string is 278 hertz? **Round answer to nearest thousandths.**

Use sign charts to solve each inequality.

9.  $x^2 + x - 12 \geq 0$

10.  $x^2 + 11x + 28 < 0$

11.  $4x^3 - 4x > 0$

12.  $(x+1)(x^2 - 3x + 2) < 0$

13.  $\frac{x}{x+3} \geq 0$

14.  $\frac{x-1}{x^2-4} < 0$

15.  $x|x-2| > 0$

16.  $(2x-1)\sqrt{x+4} < 0$

Write an inequality and solve each inequality for each of the following.

17. The perimeter of a rectangle is 60 feet. Describe the possible lengths of a side if the area of the rectangle is not to exceed 161 square feet.

18. A diver leaps into the air at 20 feet per second from a diving board that is 12 feet above the water. For how many seconds is the diver at least 10 feet above the water?

Height at time  $t$  is represented by the following equation where,  $v_o$  is the initial velocity and  $h_o$  is the initial height.  $h(t) = -16t^2 + v_o t + h_o$

**Round answer to nearest thousandths.**

19. A projectile is fired straight upward from ground level with an initial velocity of 96 feet per second. During which interval of time will the projectile's height exceed 80 feet?

Height at time  $t$  is represented by the following equation where,  $v_o$  is the initial velocity and  $h_o$  is the initial height.  $h(t) = -16t^2 + v_o t + h_o$

20. A calculator company's fixed monthly cost is \$25,000 and the cost of producing a single calculator is \$75. Describe the company's production level for the month so that the average cost of producing a calculator does not exceed \$125.